

Graded of Course of Study 2014 -2015

Following are the prescribed topics based on the new physical science standards to be covered per semester by physical science teachers in the Dublin School District.

Please note the there has been a major change in arrangement of materials by semester. This has been made necessary due to Ohio's plan to administer a 3rd quarter test (end of March) and the standards they are proposing will and won't be covered. ALL materials are going to be covered on the final Ohio test at the end of the school year.

1st semester**Energy**

- Be able to manipulate KE and GPE formulas
- Energy is measured in Joules
- Quantify Kinetic Energy (use formula)
- Quantify Gravitational Potential Energy (use formula)

Dynamics/Motion

- Work = Force x change in displacement
- Represent energy in graphical terms (pie or bar graph)
- Describe motion in terms of displacement, velocity and acceleration as being vector quantities
- All motion depends on frame of reference. There is no motionless frame of reference to judge all motion.
- Describe motion in terms of distance, position, displacement, speed, velocity, acceleration, and time
- Motion diagrams can be drawn and interpreted
 - position vs time
 - velocity vs time
 - only positive x values only and uniform motion showing constant velocity or constant acceleration
 - Data should be collected via laboratory experiences
 - Incorporate tech such as video analysis and motion detectors
 - Be able to recognize constant velocity, rest, and acceleration on position-time graphs
 - Determine average velocity by using slope on a position-time graph
 - Understand meaning of positive and negative slopes
 - Be able to recognize constant acceleration, rest and constant velocity on a velocity-time graph
 - Determine average acceleration by using slope on a velocity-time graph

Velocity = rate of change of position

- $v \text{ (avg)} = \text{displacement} / \text{elapsed time}$
- can be positive or negative
- not always equal to the speed.....provide examples
- constant velocity

- instantaneous speed

Acceleration = rate at which velocity changes

- a (avg) = change in velocity/elapsed time
- can be positive or negative
- **DO NOT** USE term deceleration
- zero acceleration = standing still OR moving at constant velocity
- constant acceleration

Displacement = $x_f - x_i$

- can be positive or negative
- not always equal to distance travelled....provide examples
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Electricity

- Flow of electrical current via electrons
- Electrical transformation to other energies
- Voltage – joules per Coulomb
- Resistance
- Current (ALL CONCEPTUALLY)
- Conductors and insulators **explained** from middle school concepts
- Potential difference or voltage
- Current measured in amps – Coulomb per second
- Power source provides electrical potential energy
- Battery – chemical reaction
- Resistors – no mention of ohms
- Construct, experiment and investigate electrical circuits to look at V, I. (No resistance or Ohm's law?) All conceptual ideas – NO Calculations – these will be addressed in physics.

2nd Semester

Classification of matter

- solubility
- Phase Changes – Effect on Volume/Density.
- Heterogeneous vs. Homogeneous
- Composition (Solutes, solvent)
- Properties of matter (chemical vs, Physical)
- Phase changes

Atoms

- Rutherford's Gold Foil experiment (only historical example/scientist that needs to be covered)
- Components of the atom
- Ions (Anions/Cations, vocabulary terms new only)
- Isotopes
- Elements unique spectra

Periodic Trends

- Periodic Law – groups/families, position and characteristics of
- Metals vs. nonmetals (expand on previous knowledge)
- Metalloids, alkali metals, alkaline earth metals, halogens, noble gases

ALL CONTENT ABOVE MUST BE TAUGHT BY THE END OF 3RD QUARTER DUE TO THE PARCC ASSESSMENTS.

Bonding

- Ionic Bonding – 3 dimensional lattice
- Covalent Bonding – small molecules to 3 dimensional lattice
- Ionic and covalent bonds are the two major bond types but there are other bonds that lie on the continuum between these two major groups
- Conventional Naming Protocols
- Includes Greek prefixes for 1-10
- Be able to go from name to formula and formula to name
- Ionic bonding – only predict compounds formed from groups 1, 2 and 17
- Covalent Bonding

Reactions (Nuclear Chemistry)

- Radioactive Decay & half-life – Graphical interpretations
- Radioisotopes uses (medicinal reference)
- Balancing Equations, Law of Conservation of Mass
- Reactants and Products
- Exothermic and Endothermic
- Electrical Forces (implied)
- Strong and Weak Nuclear forces
- Identifying Fission & Fusion

EMS/Waves

- Specific mention of sound waves (reflection, refraction, interference, diffraction)
- Opaque objects - discuss how they transfer of radiant energy
- Rough objects - diffuse reflection
- Transparent objects - discuss transfer of radiant energy through a transparent object
- Electromagnetic Spectrum
 - Application of above in daily life
 - Position of bands in order (NEED TO KNOW)
 - Colors of visible light in order (NEED TO KNOW)
- Reflection, refraction, Diffraction, Superposition (destructive and constructive interference)
- Radiant Energy
 - Travels in waves
 - Does not require a medium
 - Travels in all directions from source

Electromagnetic Spectrum

- Variety of frequency, wavelengths and energies divided into bands:
- Radio, microwaves, infrared, visible light, ultraviolet, x-rays, gamma rays

Smooth objects - reflection resulting in clear images

Doppler Shift - be able to explain using diagrams

Astronomy

- History of the Universe
 - Big Bang Theory
 - Hubble's Law
 - Red Shift
 - Cosmic Background Radiation
 - Radio telescopes/X-ray telescopes/Accelerators
- Galaxy Formation
 - Definition of a galaxy
 - Milky Way is a spiral galaxy
 - Galaxies are classified by size and shape
 - Red Shift/Doppler Effect
- Stars
 - Formed from Hydrogen and Helium
 - Fusion begins when stars reach the critical temperature
 - Classified by color, size, luminosity and mass
 - Use HR diagrams to predict the evolution of a star
 - Stars mass determines it life
 - DO NOT need to memorize star names or evolutionary patterns.
Emphasis is on reading and interpreting charts and diagrams

These things are no longer a part of the 9th grade physical science curriculum

- pH scale
- Atomic History (except for Rutherford's gold foil experiment)
- Atomic Radius
- Ionization energy
- Electronegativity
- Lewis Dot Diagrams and Electron Dot Diagrams (but may need to be included to teach bonding).
- Law of Conservation of Energy
- Conduction, Convection and Radiation
- Alloys, superconductors, semiconductors

The following content should have been already been introduced. Students may need some re-teaching.

- History of the atom
- Metals and nonmetals and their position on the periodic table.
- Simple examples of transfer of energy.
- Relationship between speed, frequency, wavelength and amplitude.
- Reflection and refraction of light.
- Conduction, convection and radiation